Just simulating? Linguistic support for continuism about remembering and imagining

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Manuscript (accepted at *Review of Philosophy and Psychology*)

Abstract

Much recent work in philosophy of memory discusses the question whether episodic remembering is continuous with imagining. This paper contributes to the debate between continuists and discontinuists by considering a previously neglected source of evidence for continuism: the linguistic properties of overt memory and imagination reports (e.g. sentences of the form 'x remembers/imagines p'). I argue that the distribution and truth-conditional contribution of episodic uses of the English verb *remember* is surprisingly similar to that of the verb *imagine* – even when compared to the distribution of other experiential attitude verbs like *see*, *hallucinate*, or *dream*. This holds despite the presence of some remarkable truth-conditional differences between *remember* and *imagine*. I show how these differences can be explained by a continuist account of remembering on which remembering is past-directed, referential, and accurate experiential imagining.

1 Introduction

A lot of recent work in neuroscience, psychology, and philosophy discusses the question whether episodic remembering is a special kind of imagining (Perrin, 2016; see e.g. Perrin and Michaelian, 2017; Schacter and Addis, 2020; Langland-Hassan, 2021; dos Santos et al., 2022). Continuists about memory and imagination – who affirm this question – hold that episodic memory is a form of (imaginative) mental time travel, such that remembering and imagining only differ in their temporal orientation and in degree (Addis, 2020; Michaelian, 2016; Munro, 2021). Discontinuists – who deny it – argue that remembering the past is fundamentally different from imagining the future (Debus, 2014; Robins, 2020; Sant'Anna, 2023), such that episodic memory is a natural kind (Cheng et al., 2016; Werning, 2020).

The debate between continuists and discontinuists is fuelled by the observation that, at least initially, philosophy and neuroscience have associated with opposing camps in this debate: while neuroscientists have found that remembering past events and simulating future events rely on many of the same cognitive and neural processes (thus supporting continuism; see Addis et al., 2007; Hassabis and Maguire, 2007; Szpunar et al., 2007), philosophers have held that remembering – unlike imagining – places demanding causal, referential, and accuracy conditions on its objects (see Martin and Deutscher, 1966; Bernecker, 2010; Debus, 2014).[1]

[1]Since there exist several accessible overviews of the continuism/discontinuism-debate (see e.g. Michaelian, 2020; Perrin and Michaelian, 2017), I refrain from (re-)introducing this debate beyond what is surveyed here.

Following the early philosophical reception of Addis et al.'s findings (e.g. in De Brigard, 2011; Michaelian, 2011, 2016), contemporary philosophy of memory has incorporated continuist arguments into its positions on the memory/imagination-relation (see Langland-Hassan, 2023; Sant'Anna, 2023; Werning, 2020). However, at present, arguments for and against continuism seem to be keeping balance. Anticipating this situation, Perrin and Michaelian (2017) write, "Given that there is [...] evidence for both continuities and discontinuities between episodic memory and [future-oriented mental time travel], such evidence is unlikely to settle the debate" (p. 231).

My paper seeks to break this deadlock by considering a previously neglected source of evidence for continuism: the linguistic properties of overt[2] memory and imagination reports. Such reports are mental state ascriptions of the form 'x remembers/imagines p', that agents use to talk about (their own, and other agents') memories and imaginings. Relevant linguistic properties of such reports include (i) which kinds of grammatical constructions (e.g. *that*-clauses, *ing*-clauses) can take the place of p ['selection'], (ii) which expressions (e.g. *vividly*, *from below*) can further specify the remembering or imagining ['modification'], and (iii) which kinds of evaluative circumstances make their reports true ['truth-conditional contribution']. Since (i) and (ii) both address the distribution of the verbs *remember* and *imagine* – and since they both concern properties of verbs or predicates rather than of full sentences –, I will sometimes treat them together.

My paper finds that the distribution and truth-conditional contribution of the English verb *remember* is surprisingly similar to that of the verb *imagine*. This holds despite the presence of some remarkable truth-conditional differences between these two verbs. Sections 3 to 5 of the paper discuss these similarities and differences. Section 6 shows how the truth-conditional differences between *remember* and *imagine* can be explained by a continuist account of episodic memory, on which remembering is past-directed, referential, and accurate imagining. I take the availability of such account as new evidence for continuism. To prepare my comparative investigation of English memory and imagination reports, I will first describe and motivate the method of semantic ascent, which is applied throughout this paper (in Sect. 2.1). I will also present some diagnostic tests for distinguishing episodic from propositional [= 'semantic'] uses of the verbs *remember* and *imagine* (in Sect. 2.2).

2 The Language of Remembering and Imagining

2.1 Methodology: semantic ascent

To identify the similarities and differences between episodic remembering and imagining, this paper uses Quine's (1953) method of semantic ascent. In its particular attitudinal version that is relevant here (see Blumberg, 2019, pp. 5–8), semantic ascent is a language-based approach to mental states that seeks to better understand these states by studying the way in which ordinary speakers talk about them (by reporting their own mental

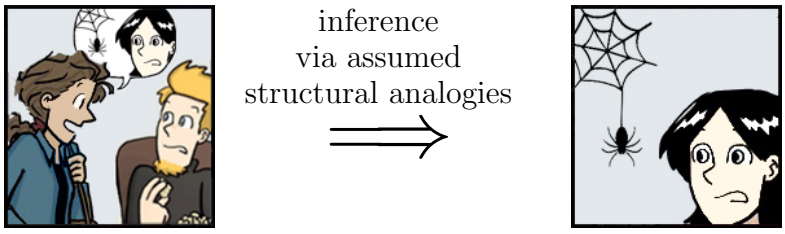
[2]These differ from covert memory/imagination reports, which do not contain the verb *remember* or *imagine* (or their cognates like *recall* or *visualize*). Covert reports describe the memory or imagination content directly, without explicit reference to the mental state itself. Instances of an overt and a covert report are given in (⋆):

(⋆) a. Cecilia {remembers, imagines} a spider webbing in her office. (overt report)
b. A spider was/is webbing in my office. [uttered by Cecilia] (covert report)

I thank Sven Bernecker for pointing out the importance of this distinction to me.

states, and by ascribing mental states to others; see De Brigard, 2023, p. 40).[3] This approach is taken in Martin and Deutscher's (1966) argument for the distinction between episodic and semantic memory, in Bernecker's (2010) argument for the distinction between experiential and propositional memory content (see also Addis et al., 2008), in Le's (2020) distinction between field and observer memories, and in Perrin et al.'s (2022) argument for the distinction between the representational contents of the feelings involved in déjà vu and déjà vécu.

The language-based approach relies on a structural correspondence between agents' conscious mental states and the language that is used to attribute these states. Granted this correspondence, the approach assumes that we can infer the properties and behavior of memory (or of imagination) from the properties and behavior of linguistic *remember*-(or *imagine*-)reports. The difference between the direct and the language-based indirect approach to mental states is illustrated in Figure 1.[4] To avoid complications that are incurred by the experience-dependence of remembering (see Sect. 5.3 and the introduction to Sect. 4), this illustration uses the example of visual perception.



a. Tajel reporting about Cecilia's perceiving (its object/content) ➥ **linguistic**

b. Cecilia visually perceiving a spider (webbing) ➥ **mental**

Figure 1: The language-based vs. the direct approach to perception.

Recently, semantic ascent has been criticized for the lack of reliable inferences from linguistic to mental/neuropsychological distinctions, or from particular linguistic to mental properties. According to some theorists, "asking subjects to report their awareness of the stimulus introduces a confound" (Michel and Morales, 2020, p. 497). Purported neural correlates are thus "overestimated, in the sense that neural mechanisms [that are] not directly generating the experience, but [are] only necessary to report it, are included" (Tsuchiya et al., 2015, p. 758; see also Koch et al., 2016; Pitts et al., 2014). Summarizing these and other objections, Blumberg (2019) remarks that "language is one thing, and the mind is another" (p. 5).

The above objections to semantic ascent notwithstanding, it is difficult to see how one could, at present, obtain more reliable information about (some areas of) the human mind (see Perrin et al., 2022). Given that we are still a long way away from an accurate brain-to-mind mapping (*pace* impressive recent advances in neuroscience), it seems difficult to see how else one could proceed. This is corroborated by the fact that much contemporary research in psychology and neuroscience still uses report-based experimental methods (where 'report-based' is understood in a more general sense that also includes e.g. confidence ratings and reports on the visibility of the stimulus; see Michel and Morales, 2020; Irvine, 2013).

[3] In the philosophical literature, this approach is sometimes called the 'language-first' approach to mental content (see Moltmann, 2024; Blumberg, 2019, Sect. 1.3). To avoid the implicit contrast with 'mental-first' (as drawn e.g. in Phillips, 2023), I instead use the weaker description 'language-based'.

[4] Source: based on "Piled Higher and Deeper" by Jorge Cham, `www.phdcomics.com`.

Another line of criticism that is sometimes launched against semantic ascent observes (i) the common lack of concrete cases in which this method is used to argue for the *distinctness* of two mental states. This line of criticism further laments (ii) the lack of a discussion about when semantic ascent would be expected fail (or would be seriously questioned) as a method for gaining information about agents' mental states. Following an introduction of the different phenomenological properties of episodic remembering and imagining, I will sketch a counterfactual example for a failure of this method (see (ii)) at the end of the present subsection.

In the meantime, I will use a toy example to show what level of (dis-)similarity would constitute an argument for *dis*continuism (see (i)). This example (which is loosely based on Ciardelli et al., 2018) uses the mental states of believing and wondering. Continuism about believing and wondering would amount to claiming that believing is just a special kind of wondering (or vice versa). Discontinuism would hold that believing is fundamentally different from wondering. Since believing and wondering can both be linguistically expressed (in English: through the verbs *believe* and *wonder*), semantic ascent assumes that continuism would be supported if the linguistic behavior of *believe* – across all levels of linguistic analysis (i.e. morphology, syntax, lexicon, semantics, pragmatics)[5] – were a restricted case of the behavior of *wonder* (with a total behavioral identity being the limiting case).

That the above is <u>not</u> the case is already evident from these verbs' selection behavior: While *believe* only embeds declarative (i.e. *that*-) clauses (see (1a)), *wonder* only accepts polar (i.e. *whether*-) and constituent (e.g. *who*/*what*/*where*/*when*-) interrogative clauses (see (1b), where a superscript asterisk marks ungrammaticality; see Grimshaw, 1979; Lahiri, 2002).[6] This difference alone already warrants a discontinuist conclusion.

(1) Cecilia
a. believes {✓that a spider, *whether a spider, *who}
b. wonders {*that a spider, ✓whether a spider, ✓who}
c. knows {✓that a spider, ✓whether a spider, ✓who}
was webbing.

The situation is different for believing (or wondering) and <u>knowing</u>: since the verb *know* embeds both declarative and interrogative clauses (see (1c)), the selection behavior of *believe* (and likewise, of *wonder*) is indeed a special [= more restrictive] case of the selection behavior of *know*. This suggests that selection does not stand in the way of a continuist position about believing (or wondering) and knowing. However, since selection is only one of many different linguistic properties/levels (see the penultimate paragraph), the selection data from (1) does not, by itself, support continuism about knowing and believing. In fact, since *know*-reports have much stricter truth-conditions than *belief*-reports – such that the restriction relation is reversed at the level of semantics –, continuism about knowing and believing is eventually not defensible. The above example shows that using semantic ascent to argue for a continuist position is a much more challenging task than might at first glance be expected.

In view of the above challenges for semantic ascent, it is not hard to see why there have been surprisingly few defenses of this method. Existing attempts refer to the fact that linguistic semantics provides formal tools that may also benefit the analysis of mental states,

[5]Eventually, this general linguistic investigation would also require studying these behaviors across <u>all</u> attested natural languages. I defer such cross-linguistic investigation to my colleagues in linguistic typology (but see my footnote 13).

[6]While this presentation reflects the pre-2021 view of clausal selection, it is not an accurate depiction of the contemporary empirical landscape. In particular, White (2021) has shown (on the basis of corpus and experimental data) that *believe* sometimes also occurs with an interrogative clause. To avoid complicating my toy example, I here ignore White's findings. However, these findings again show that supporting a continuist position is not so simple.

to philosophy of language's long-standing interest in these states, and to the fact that supporting the language/mind-correspondence is in itself an interesting challenge (see Blumberg, 2019). The present paper advances another line of support for semantic ascent: Given that there turns out to be a very close correspondence between the properties of the mental states of episodic remembering/imagining and the linguistic properties of *remember*-/*imagine*-reports (as I will show in Sect. 3–5 and at the end of this subsection), it would be surprising if this correspondence turned out to be a local coincidence. This holds especially since this correspondence can be observed for diverse phenomenological and other properties (s.t. this correspondence shows a certain robustness), and since it is also attested – at least in part – by other experience-dependent mental states (e.g. by hallucinating and dreaming).[7] I will identify several such properties in Sections 3 and 4.

Examples of these properties (beyond the properties that will be discussed below) are mental imagery (Addis et al., 2008; Arcangeli, 2020), experience-likeness (Cheng et al., 2016), and a sense of self (Klein and Nichols, 2012; Tulving, 2005). Expectedly,[8] these properties all have linguistic correlates. The latter are morphemes, words, or grammatical constructions that have these properties as their semantic [= lexical, conventional] or pragmatic [= non-lexical, contextual] meaning[9] or that are, in a looser sense, associated with these properties (see (2); Addis et al., 2008). Linguistic elements that semantically denote a phenomenological property (here: sense of self) include the reflexive -*self* (see (3); Higginbotham, 2003). Elements that only pragmatically express – but do not semantically denote – such a property (here: experience-likeness) include the exclamative *brrr* (see (2); see Vendler, 1979). Further linguistic correlates of experience-likeness are present tense (marked by a solid underline in (2)–(3); see Abusch, 1997) and progressive aspect (marked by a dashed underline; see Umbach et al., 2022). Correlates of mental imagery and sense of self further include rich descriptive detail (Addis et al., 2008; St. Jacques and Levine, 2007) and, respectively, the silent pronoun PRO (which simultaneously marks field perspective; see Liefke, 2024c). Examples (2) and (3) are inspired by Vendler (1979).

(2) Zeno {i. remembers, ii. imagines} PRO swimming in the ocean: *brrr – the water is cold and tastes salty, the current is tugging on his legs, ...*

(3) Zeno {i. remembers, ii. imagines} him*self* swimming in the ocean: *his scrawny body is (being) tossed about, bobbing up and down in the foamy waste, ...*

The fact that *remember* and *imagine* behave very similar with respect to these correlates (all above-listed combinations are attested for *remember* as well as for *imagine*) then supports a similarity between the mental states of episodic remembering and imagining.

Interestingly, the above-identified correlates also help show which (counterfactual) observations would challenge the method of semantic ascent: Assume (with Mahr, 2020 and Michaelian, 2016) that episodic remembering and imagining share many phenomenological properties (e.g. mental imagery, experience-likeness, perspectivity, sense of self), but that – contrary to the linguistic data from (2) and (3) – *remember* and *imagine* would differ in their distribution with respect to the linguistic correlates of (at least some of) these properties. This would be the case if the first sentence in (3-i) – with the reflexive *self* – was acceptable, but its *imagine*-counterpart, (3-ii), deviant. Of course, such finding might not immediately show that the method of semantic ascent fails: The mismatch

[7] I will explain in Section 3 why these parallelisms can nevertheless not be used to support continuism about imagining and hallucinating (or dreaming).

[8] This is expected on the basis of the observation that linguistic agents can proficiently and accurately ascribe episodic memories/imaginings with these properties (see e.g. Addis et al., 2008), and that they can even verbally refer to – and single out – these properties.

[9] For a careful distinction between these different dimensions of linguistic meaning, the reader is referred to (Gutzmann, 2021).

between the psychological and the linguistic data could also be due to the poor quality of the linguistic (or of the psychological) data, or to false assumptions about the match in phenomenological properties. However, the discrepancy between the linguistic and the psychological data would at least cast doubt on the reliability of this method.

That the reliability of semantic ascent depends on the quality of the linguistic data bears an important lesson for our linguistic data collection: To reduce the risk of drawing false conclusions, I must ensure that my data is robust and of high quality. Sections 3 to 5 comply with this demand by studying a very large (i.e. 52-billion-word) text corpus, by considering both corpus/production and judgement data (see the next paragraph), and by analyzing data from different levels of linguistic analysis. In line with the latter, I base my argument on syntactic (see Sect. 3.1), lexical (see Sect. 3.2), and (truth-conditional) semantic data (see Sect. 4–5), as well as on the above morphological, lexical, and pragmatic data (see (2)–(3)). I expect that the diversity of this data will add to the robustness of the presented linguistic support for continuism.

I close this subsection with a comment on the notions of acceptability, intuitiveness, and truth that are used throughout this paper: In much of what follows, I will be basing my argument on the 'acceptability' of linguistic constructions (specifically: on whether constructions of a given form are frequently used by native speakers of English, as attested in the linguistic research literature). This holds for the selection data from Section 3.1 (which is assembled from contemporary work on *remember* and *imagine*; see e.g. D'Ambrosio and Stoljar, 2021; Higginbotham, 2003; Liefke, 2023b) and for the experiential modification data for *remember* and *imagine* from Section 3.2 (due to Stephenson, 2010). For those constructions that are not discussed in the literature, I conduct my own corpus analysis (using Sketch Engine's *enTenTen21* corpus). This is the case for the selection and experiential modification data for *see*, *hallucinate*, and *dream* (in Sect. 3.1, 3.2). For a discussion of the corpus method in semantic ascent, the reader is referred to Appendix B.

The acceptability data from Section 3 all assume the perspective of a competent speaker of English. However, this perspective is not very helpful when trying to identify a report's truth-conditions (as will be done in the later sections of this paper).[10] To obtain these conditions, Sections 4–5 will move from a speaker's perspective ('Which constructions are attested?') to a hearer's perspective ('In which circumstances of evaluation is a given construction TRUE?'). The majority of these judgements will be based on observations from the linguistic (see Sect. 4.3, 5.2), philosophical (see Sect. 4, 5.1, 5.4), and psychological literature (see Sect. 4.1, 5.3, 5.4). Some of these judgements (e.g. the factivity judgements from Sect. 4.2) will be based on experimental work (here: Dranseika, 2020). I will return to the prospects of a holistic experimental elicitation of these judgements in Section 7.

This completes my introduction of the methods and tools that will be used in this paper. To prepare my investigation of the behavior of the verbs *remember* and *imagine*, I now present some diagnostic tests for identifying episodic uses of these two verbs. For a more detailed presentation of these tests, the reader is referred to (Liefke, 2023a).

[10] Corpora typically do not contain information about the circumstance in which a given linguistic construction was uttered, or what situation it was used to describe.

2.2 Experiential vs. propositional remembering and imagining

Remembering – like imagining – is typically taken to come in two kinds: experiential (or 'episodic') and propositional (or 'semantic')[11] remembering (see e.g. Bernecker, 2010; Michaelian et al., 2020; Tulving, 1972). Episodic remembering is intuitively taken to be a relation to a personally experienced past event, scene, or scenario[12] (e.g. some spider webbing in Cecilia's office). Propositional remembering is a relation to a proposition or proposition-like object, e.g. a fact (e.g. that the spider was a black house spider).

It has long been assumed that the episodic/propositional-distinction is grammatically coded by the distinction between *that*-clauses like (4b) and gerundive *-ing* constructions like (4a) (see Bernecker, 2010; Craver, 2020). This assumption is supported by the observation that only (4b-i), but not (4a-i), is true if Cecilia only knows from testimony that a spider was webbing in her office (e.g. because Tajel told her about it), but has not witnessed the relevant webbing-event herself.

(4) a. Cecilia {i. remembers, ii. imagines} a spider webbing in her office.
b. Cecilia {i. remembers, ii. imagines} that a spider was webbing in her office.

The difference regarding the preconditions of propositional and episodic remembering is illustrated in Figure 2.

a. Tajel told Cecilia that a spider was webbing in her office ➥ **testimony**

b. Cecilia has seen a spider web in her office ➥ **experience**

Figure 2: Experiential base for propositional (a, b) vs. episodic remembering (b).

Recent work in the philosophy of language and mind has questioned a strict grammaticalization of the propositional/episodic-distinction (see e.g. De Brigard, 2011; Liefke, 2023a; Werning and Cheng, 2017). This questioning is motivated by the observation that (4a-i) and (4b-i) are both true in a situation where Cecilia herself has seen a spider web in her office, such that the alleged grammaticalization does not hold for the case '*that* → propositional' (Rosina and Liefke, in preparation). Another reason for questioning the propositional/episodic-grammaticalization is that, in many languages (incl. German), *remember* and *imagine* reject *-ing* constructions, such that this grammaticalization – if it were to hold in a particular language – would not be cross-linguistically robust (Liefke and Werning, 2024; see also De Brigard, 2023).

Despite the above, episodic uses of *remember* and *imagine* can be distinguished from propositional uses through a number of diagnostic properties. These include the possibility of replacing the clause that is embedded under episodic uses of *remember* or *imagine* by an explicitly event- or scene-denoting expression (see Liefke, 2024a; Umbach et al.,

[11] To avoid an ambiguous use of 'semantic' between an adjective for non-episodic remembering/imagining and for conventional context-independent meaning, I hereafter use the term 'propositional' to describe non-episodic remembering (and analogously for imagining).

[12] In this paper, I will use the terms 'event'/'scene' and 'scenario' interchangeably, without suggesting an ontological difference.

2022). They also include the possibility of inferring the agent's direct experience of the scene that is described by this clause (see Stephenson, 2010). For (4a), these diagnostics are exemplified by (5a) and (5b):

(5) Cecilia {i. remembers, ii. imagines} a spider webbing in her office.

≡ a. Cecilia {i. remembers, ii. imagines} *an event/scene in which* a spider was webbing in her office.

⇒ b. Cecilia {i. has perceptually experienced, ii. mentally simulated} a spider webbing in her office.

The *that*-clause counterpart of (4a), i.e. (4b), fails these diagnostics as expected. This failure is even more apparent in *that*-clause memory and imagination reports like (6), whose embedded clause blocks an episodic reading. In particular, given that being a house spider is not (straightforwardly) an action or perceivable property, it seems very hard – if not impossible – to construct an event or scene in which a certain spider is a house spider.

(6) Cecilia {i. remembers, ii. imagines} that the spider from her office was a black house spider.

≢ a. ??Cecilia {i. remembers, ii. imagines} *a scene in which* the spider from her office was/is a black house spider.

⇏ b. ??Cecilia {i. has experienced, ii. mentally simulated} the spider from her office being a black house spider.

I will come back to these considerations in Section 3.1. There, I will introduce two further diagnostic properties (i.e. modification through the experiential adverb *vividly* and through locative modifiers or viewpoint adjuncts). In what follows, I take 'memory' respectively 'imagination' and the verbs *remember* or *imagine* to refer to episodic memory/ imagination and to episodic uses of the verb *remember* respectively *imagine*.

3 Distributional Similarities

I have suggested above that – granted semantic ascent – distributional similarities between the English verbs *remember* and *imagine* can be taken as a first line of support for continuism about episodic remembering and imagining. Below, I identify two kinds of such similarities, starting with selectional similarities (in Sect. 3.1). The latter are similarities that regard the different grammatical constructions with which the verb combines. I will then turn to similarities regarding which expressions can modify episodic uses of *remember* and *imagine* (in Sect. 3.2).

Admittedly, selection and modification are not the only distributional properties of *remember* and *imagine* that may be used to support their semantic similarity or dissimilarity. As my discussion from the end of Section 2.1 has suggested, further properties include tense (past vs. present vs. future), aspect (progressive vs. perfective), and mood (indicative vs. subjunctive). I will show in Section 5 that some of these properties indeed indicate a distributional difference between *remember* and *imagine*. This holds, e.g., for future tense and subjunctive mood of the embedded predicate, which are both only licensed by *imagine*, but not by *remember* (see (7)). This licensing is enabled by the non-[or not necessarily-]past-directedness (see Sect. 5.2) and counterfactuality of *imagine* (see Sect. 5.1).

(7) a. Cecilia {i. ??remembers, ii. ✓imagines} how a spider will be webbing in her office.
b. Cecilia {i. ??remembers, ii. ✓imagines} that she had caught the spider in her office.

The above notwithstanding, the licensing of future tense and subjunctive mood is uniformly stricter for *remember* than for *imagine* (such that it can be captured by assuming that the meaning of *remember* is a more restricted case of the meaning of *imagine*). As a result, this licensing behavior does not stand in the way of continuism about remembering and imagininig (see my elaborations in Sect. 6).

3.1 Selectional similarities

Recent work in linguistics and the philosophy of language has found that the verbs *remember* and *imagine* are very similar with regard to which grammatical constructions they embed.[13] In particular, *remember* and *imagine* both accept gerundive *ing*-constructions with a covert subject (i.e. the silent pronoun PRO; see (8a)). They also accept *ing*-constructions with a reflexive subject (see (8b)), with an explicit subject (see (8c)), and with a possessive subject (see (8d)).[14] As has been observed in (Liefke, 2023a) (see also Liefke and D'Ambrosio, 2024; Liefke and Werning, 2024), *remember* and *imagine* moreover both combine with 'free relative'-readings of interrogative clauses (8e), with *whether*-clauses (8f), with eventive *how*-clause complements (8h), with *that*-clauses (8g), and with explicitly event-denoting expressions (8i) and event nominalizations (8j), as well as with concrete and abstract direct objects (8k/l).

(8) Cecilia remembers/imagines {

a.	**PRO** moving.	(PRO-*ing* construction)
b.	her**self** moving.	(PRO/ACC-*ing*)
c.	a spider moving.	(ACC-*ing* construction)
d.	a spider**'s** moving.	(POSS-*ing* construction)
e.	**who** was moving.	(free relative clause)
f.	**whether** a spider was moving.	(*whether*-clause)
g.	**that** a spider was moving.	(*that*-clause)
h.	**how** a spider was moving.	(eventive *how*-clause)
i.	**an event** in which a spider was ...	(eventive object)
j.	a move (of a spider).	(event nominalization)
k.	a spider.	(concrete object)
l.	Tajel's claim (viz. that ...).	(abstract object)

}

The ability of *remember* and *imagine* to embed constructions with the silent pronoun PRO (see (8a)) suggests that these predicates can function as subject control verbs. Since such verbs are obligatorily interpreted *de se* (i.e. as self-ascribed or self-locating properties; see Lewis, 1979; Chierchia, 1989), *remember*- and *imagine*-reports contain a linguistic

[13] Importantly, this behavior is not shared by all memory verbs. Thus, while the closest German counterpart of *remember*, i.e. *sich erinnern* ['REFL-remember'], shares the selection behavior from (8) (modulo some language-specific pecularities), the complex German memory predicate *noch (genau) wissen* ['still (exactly/vividly) know'] rejects non-finite complements (see (8a–d)) and direct objects (see (8i–j)). I assume that this restrictiveness is due to the different selection profile of the constitutent verb *wissen* [propositional 'know'] in this construction (see Rosina and Liefke, accepted).

[14] *Remember* and *imagine* also combine with procedural *how* (as in *Cecilia remembered how to swim*) and with prospective *to*-infinitives (as in *Cecilia remembered to swim*). However, since these constructions are not licensed by episodic uses of *remember* and *imagine*, I exclude them from my discussion.

counterpart of the sense of self in episodic memory (see Conway, 2005; Rathbone et al., 2011; Tulving, 2005).

The list of grammatical constructions in (8) suggests that the verbs *remember* and *imagine* have exactly the same embedding behavior. This suggestion is challenged by the observation that *whether*-clauses more commonly occur with *remember* than with *imagine* (see the quantitative results in White, 2021 and in Appendix B: Dataset 1). Regardless of this finding, *imagine* also accepts *whether*-clauses (see (8f)). Attested examples of *imagine whether*-constructions (from the *enTenTen21* corpus) are given in (9).

(9) a. Imagine **whether** your outfit will look good when printed for your living room wall.
b. I could not imagine **whether** I could finish my project on time.
c. I've been trying to imagine **whether** a man would agree to have a child if it was physically possible.

Importantly, *remember* and *imagine* are not only similar with respect to which grammatical constructions they embed. They are also similar in admitting many different grammatical constructions, i.e. they are selectionally super-flexible (Liefke, 2021). Selectional flexibility is generally taken to be a predicate's ability to accept both *that*-clauses (e.g. (10a)), *whether*-clauses (10b), and 'constituent'-interrogative clauses (10c) as well as abstract objects with propositional content (10d) (see Theiler et al., 2019, who attribute selectional flexibility to so-called 'responsive predicates' like *know*; see the present paper's example (1c) in Sect. 2.1).

(10) Cecilia knows { a. **that** / b. **whether** / c. **where** } a spider webbed.
d. Pythagoras' Theorem.

Remember and *imagine* differ from responsive predicates in accepting more and more diverse grammatical constructions. In virtue of the former, *remember* and *imagine* embed twelve (!), instead of only four, different constructions. In virtue of the latter, their embedding is not restricted to constructions with propositional content.

Interestingly, the selection behavior from (8) is, in large part, also shared by other experiential attitude verbs (esp. by perception verbs like *see*, *hear*, or *feel*, and by representational counterfactual attitude verbs like *hallucinate* or *dream (of)*; see Liefke, 2023a). Thus, like *remember* and *imagine*, *see*, *dream*, and *hallucinate* successfully embed constructions of the form of (8b–d, f–g, i–k). However, unlike *remember* and *imagine*, *see* typically does not occur with PRO-constructions like (8a)[15] and rejects abstract direct objects like (8l). In contrast to their selectionally super-flexible counterparts, *dream* and *hallucinate* are hesitant to combine with interrogative clauses like (8e, h). For corpus-based support for these observations (based on data from the *enTenTen21* corpus), the reader is referred to Appendix B (Dataset 1).

The rough selectional similarity between *remember* / *imagine* and other experiential attitude verbs supports a (fairly) close behavioral correspondence between memory-, perception-, hallucination-, and dream-reports. If this correspondence were as close for

[15]For an account of why *see* rejects PRO-*ing* constructions, the reader is referred to (Liefke, 2024c). This explanation uses the fact that the silent pronoun PRO denotes field perspective (McCarroll, 2018), rather than self-location/sense of self (Lewis, 1979). The assumption that visual perception is a first-order attitude (which does not depend on the objects or contents of another experience and, hence, cannot involve a shifted perspective) then makes the embedded subject PRO redundant, and the resulting construction deviant.

these reports as it is for memory- and imagination-reports, it could be used to argue for continuism between remembering, seeing, hallucinating, and dreaming, *pace* what is reflected in the philosophical literature.[16] However, my observations from the previous paragraph do not support this broader continuist hypothesis.

The reason why the similarity between memory- perception-, hallucination-, and dream reports is not VERY close – contra the relation between memory- and imagination-reports – further lies in the observation that only *remember* and *imagine* (but not *see* or *hallucinate*) allow for unrestricted experiential and perspectival modification. Following a description of the modificational similarities between *remember* and *imagine*, I will return to this contrast at the end of Section 3.2.

3.2 Modificational similarities

I have already suggested above that the English verbs *remember* and *imagine* can be further specified by the same kinds of expressions. These include experiential modifiers like *vividly* or *in vivid/perfect detail* (see (11)), which are commonly associated with rich mental imagery and experience-likeness (Stephenson, 2010). Some of the phenomenological similarity between episodic memory and imagination is thus directly reflected in the modification behavior of the verbs for these mental states.

(11) a. Cecilia *vividly* {i. remembers, ii. imagines} a spider webbing in her office.
b. Cecilia {i. remembers, ii. imagines} *in perfect detail* how a spider was/is webbing in her office.

Admittedly, the adverb *vividly* can also be used to modify *remember* and *imagine* <u>*that*</u> (see (12)). This is explained by my assumption that *that*-clause memory reports are ambiguous between a propositional and an episodic interpretation (see Sect. 2.2). The modification of *remember (that)* with *vividly* is then only possible on the verb's episodic use. The exclusion of propositional *vividly*-modification is supported by the observation that *vividly remember that* rejects complements that force a propositional interpretation. This is exemplified by the semantic deviance, #, of the report in (13).

(12) Cecilia *vividly* {i. remembers, ii. imagines} that a spider was/is webbing in her office.

(13) #Cecilia *vividly* {i. remembers, ii. imagines} that the spider from her office was/is a black house spider.

Importantly, *remember* and *imagine* are not only alike with respect to experiential modification. They also both allow for the explicit expression of perspective (Vendler, 1979; D'Ambrosio and Stoljar, 2023). This expression can take place through a viewpoint adjunct (e.g. *from the perspective/point of view of* ..., see (14a)) or through a locative modifier (e.g. *from below*). It can even include 'shifted' perspectives (expressed by (14b)), in which an event is (re-)experienced from a perspective that is different from the original perspective (see e.g. McCarroll, 2018; Nigro and Neisser, 1983; Rice and Rubin, 2009). The latter is a perspective whose source, i.e. the 'viewpoint', is distinct from the subject of the (original) experience, and can even be unoccupied.

[16] I have argued in (Liefke, 2023a) that this similarity is due to the fact that all experiential attitude verbs take the same kind of semantic argument (intuitively: an event, scene, or situation; see Barwise, 1981; Grimm and McNally, 2015; Stephenson, 2010). In view of this uniformity – and because of the by-and-large systematicity of the syntax-semantics relation (see Liefke, 2024b) –, the selectional similarity of *remember*, *see*, *hallucinate*, and *dream (of)* is not particularly surprising (in the sense of 'surprise' from the last paragraph of Sect. 1). I thank an anonymous reviewer for pushing me on this point.

(14) a. Cecilia {i. remembers, ii. imagines} a spider webbing *from her original onlooker's perspective (viz. Cecilia/herself sitting at her desk).*

b. Cecilia {i. visualizes, ii. imagines} a spider webbing *from below/from the visual perspective of a fly on the ceiling/from the spider's own perspective/from the (emotional) point of view of an arachnophobiac.*

A glance at (14b) already suggests that 'shifted perspective'-memories are typically not reported through the use of the verb *remember* or its cognates. Instead, they are more naturally ascribed by using the verb *imagine* or the predicate *visualize*, *(mentally) simulate*, or *form a mental image of*.[17] I take this observation as further support for the continuist assumption that episodic remembering is a special instance of experiential imagining.

Note that, in contrast to the above, perspectival modification in veridical visual perception reports is either redundant or contradictory. The former is the case when the modifier identifies the original, field perspective (consider the *see*-variant of (14a) in (15a), whose redundancy-induced deviance is marked by a superscript question mark). The latter is the case when the modifier identifies a displaced, observer perspective (consider the *see*-variant of (14b) in (15b), whose contradictoriness is captured by the superscript hash sign).

(15) a. $^{?}$Cecilia sees a spider webbing *from an onlooker's perspective.*

b. $^{\#}$Cecilia sees a spider webbing *from the visual perspective of a fly on the ceiling/from the (emotional) point of view of an arachnophobiac.*

In contrast to their memory- and imagination-counterparts, visual perception reports further reject *vividly*-modification.[18] This is evidenced by the deviance of the *see*-variant of (11a) (in (16)).

(16) $^{??}$Cecilia *vividly* sees a spider webbing in her office.

The situation is slightly different for *hallucinate* and *dream*: both verbs allow for experiential (see (17)) and field-perspectival modification (see (18a)),[19] even if *hallucinate* is hesitant to allow modification with an observer perspective (see the superscript question mark in the *hallucinate*-case of (18b)).

(17) Cecilia is *vividly* {hallucinating, dreaming of} a spider webbing in her office.

(18) a. Cecilia {hallucinates, is dreaming of} a spider webbing *from an onlooker's perspective.*

b. Cecilia {$^{?}$hallucinates, is dreaming of} a spider webbing *from the perspective of a fly on the ceiling/$^{??}$from the emotional point of view of an arachnophobiac.*

The hesitance to accept an observer-perspective modifier turns into a fully-fledged rejection when this modifier is moved to a non-visual mode of experience (see the double superscript question marks preceding *from the emotional point of view ...* in (18b)). This rejection is parallel to the rejection of (visual- or non-visual mode-)observer-perspective modifiers in *see*-reports (see (15b)). In combination with the selectional differences between *hallucinate/dream* and *remember/imagine* (see Sect. 3.1), the above differences block a defense of continuism about imagining (or remembering) and dreaming, or about imagining and hallucinating.

[17] This is the result of an informal inquiry of seven native speakers of American English.

[18] For the *enTenTen21* data supporting this rejection, the reader is referred to Appendix B: Dataset 2.

[19] This holds according to the literature on vivid dreaming (see e.g. Rosen, 2018; Morgan, 2022) and in virtue of the (fairly) high frequency of '*vividly hallucinate*'-constructions (see Appendix B: Dataset 2).

4 Truth-Conditional Similarities

A continuist treatment of remembering and imagining is also supported by the observation that the reports from (4a-i/ii) (copied in (19) below) are true in some of the same evaluative circumstances. These include circumstances in which the content of Cecilia's (mnemically or imagistically) constructed[20] scenario is part of Cecilia's original experience (see Sect. 4.3). They further include circumstances in which the content of Cecilia's scenario goes beyond what Cecilia has originally experienced (see Sect. 4.1) and in which Cecilia's scenario content *contradicts* the content of her original experience (see Sect. 4.2).

The above descriptions already suggest that, as used in the present Section, imagination is a second-order attitude. The latter is a mental state whose content depends on the objects of an another, underlying, experience (in Sect. 4.1–4.2: on the spider from Cecilia's veridical visual perception; see Blumberg, 2019, pp. 95–99). In contrast to the objects of second-order imagination, the objects of first-order imagination (which will be exploited in Circumstance F) are only created in the act of imagining. For an overview list of the different evaluative circumstances that will be used in this paper, together with their illustrations, the reader is referred to Appendix A.

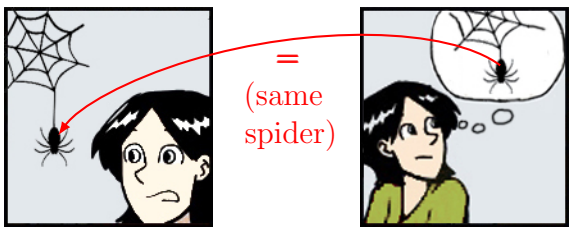
To enable a direct comparison of the truth-conditional contribution of the verbs *remember* and *imagine*, I will use minimal *remember*/*imagine*-pairs. The latter are pairs of memory and imagination reports like (4a-i/ii) (copied in (19-i/ii) below) that only differ with respect to the matrix verb, viz. *remember* resp. *imagine*. The subject of these reports (in (19-i/ii): *Cecilia*) and the embedded clause (in (19-i/ii): *a spider webbing in her office*) are the same in both sentences from this pair.

4.1 Generativity

The evaluative circumstances below all treat episodic remembering as a constructive simulation process that yields an informationally (or imagistically) rich, experience-like, and perspectival scenario (see e.g. Addis, 2018; Cheng et al., 2016). This treatment is reflected in the specific description of Circumstance A (see (20); illustrated in Fig. 3). In this circumstance, Cecilia is constructing a scenario in which the spider whom she has seen in her office is webbing.

(19) Cecilia {i. remembers, ii. imagines} a spider webbing in her office.

(20) Circumstance A: Cecilia is constructing a scenario in which the spider whom she has seen in her office is webbing.



Context Circumstance A

Figure 3: Circumstance A and its context.

[20]To allow that (4a-i) and (4a-ii) are true in the same circumstance, I provide a general description of evaluative circumstances in terms of 'constructing scenarios' (rather than 'remembering' or 'imagining').

Note that CIRCUMSTANCE A does not presume that the spider was webbing in Cecilia's original experience. Rather, it is compatible with the assumption that Cecilia's experience does not contain any information about the spider's webbing (s.t. the spider was neither webbing nor not webbing in Cecilia's experience). This is made possible by the partiality of perception, by which an agent typically only perceives a small part of their environment (due to lack of attention, to other attentional foci, to the agent's perceptual sensitivity, and to other conditions of perception; see e.g. Martina, 2021). In these cases, the spider's webbing is a product of the generative process of constructive episodic simulation (see Schacter and Addis, 2007; Addis, 2018). During this process, information about the spider (here: its webbing) is supplemented from semantic information and general world knowledge, or as episodic information from other experiences. The fact that CIRCUMSTANCE A makes both (19-i) and (19-ii) true supports the constructive, or generative nature of episodic remembering and imagining.

4.2 Non-factuality

The generativity of episodic remembering and imagining even goes beyond the supplementation of experientially underdetermined information (i.e. information that is neither true nor false in the original experience): It allows for the attribution of seemingly contradictory information (in CIRCUMSTANCE B: the contradictory propositions from (22)). Such attribution is supported by the observation that (19-i) and (19-ii) are intuitively both true in a circumstance in which Cecilia is constructing a scenario in which the spider from her office has a property (viz. webbing) which it did not have in Cecilia's original experience (or in its underlying real-world event).

(21) CIRCUMSTANCE B: Cecilia is constructing a scenario in which the spider who was <u>not</u> webbing in her office is webbing.

(22) a. The spider from Cecilia's office is webbing. (memory)
b. The spider from Cecilia's office is <u>not</u> webbing. (experience)

At a neural level, the attribution of seemingly contradictory information is made possible by the assumption of sparse or empty memory traces (see e.g. De Brigard, 2011; Fayyaz et al., 2022; Werning, 2020). Since such traces contain little or no representational content, there is nothing about them that could serve as a restrictor on the supplemented semantic information. In particular, if Cecilia's memory trace from the context in Figure 3 does not contain the representational information in (22b), it is still compatible with the information in (22a).

The compatibility of (22b) with (22a) is supported by Hazlett's (2010) observation that sentences of the form '*a* remembers *p*, but not-*p*' (see (23))[21] are not contradictory, but at worst incoherent (analogously to Moore's (1959) 'It is raining outside, but I don't believe it'). Confirming this intuition, De Brigard (2023) states, "it is not impossible to think of a competent user who could rationally and truthfully utter a sentence such as [(23)]" (p. 15). A (19-i)-specific analogue of this sentence is given in (24):

(23) I remember I was drinking tequila, but I was not drinking tequila.

(24) Cecilia remembers a spider webbing in her office, but the spider was not webbing.

At a more general linguistic level, the truth of (19-i) in circumstances like B is supported by the possibility of reporting false memories through the use of the verb *remember*

[21] This is a stronger version of Moore's paradox that assumes that *p* has existential import. I discuss existential import in the context of (25).

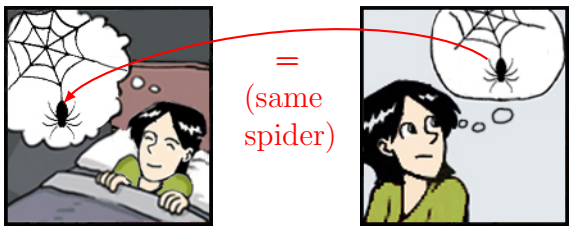
and its cognates (see e.g. Hazlett, 2010; Werning and Liefke, accepted). This is reflected in De Brigard's (2023) observation that "competent users of the verb *to remember* often don't abide by [the factivity constraint]" (p. 16). The possibility of using *remember* to report false memories is supported by recent experiments that study speakers' willingness to classify a specific instance of scenario construction as a case of remembering (viz. Dranseika, 2020). These experiments have found that "the ordinary use of [the Lithuanian counterpart of] the predicates *remember* and *having a memory of* is not bound by [...] the factivity constraint" (p. 177).

Importantly, the non-factivity of the verb *remember* is not restricted to the ability to attribute incoherent properties (as in (21)/(24)). It is also reflected in the possibility that the remembered contents may lack existential import (s.t. the individual object in the mnemic scenario does not actually exist; see Forbes, 2020). The latter is the case in memories from hallucinations and from dreams (see (25) and Fig. 4; cf. Michaelian, 2023; Werning and Liefke, accepted). Since the individual referents of these memories (in (25): the spider from Cecilia's dream) do not exist in the real world, the inference to (25b) is intuitively invalid.

(25) *Context:* Last night, Cecilia dreamt of a spider moving about in her office.

a. (Now,) Cecilia remembers a/the spider webbing in her office.

⊭ b. There exist a (past) real-world spider whom Cecilia remembers webbing in her office.



Other context CIRCUMSTANCE B

Figure 4: CIRCUMSTANCE B and its alternative context.

The above shows that – like its imagination-counterpart – the memory report in (4a-i) does not require that an actual spider was in fact webbing in Cecilia's office. In virtue of this finding, the verbs *remember* and *imagine* share the same non-factive behavior.

4.3 Veridicality

The observed non-factivity of *remember* would lead one to suspect that the memory and imagination reports from (4a) would also both be true in circumstances like CIRCUMSTANCE C below, in which the content of Cecilia's constructed scenario is part of her original experience. The latter is indeed the case. This holds despite the strong intuition that the imagination report in (4a-ii) is infelicitous, deviant, or (at least) odd in CIRCUMSTANCE C. To capture this deviance, I mark the *imagine*-variant of (4a) with a single superscript question mark in (26). The deviance of (26-ii) captures the counterfactuality of episodic imagination (see e.g. Arcangeli, 2021; Langland-Hassan, 2021; Mahr, 2020).

(26) Cecilia {i.$^{\checkmark}$remembers, ii.$^{?}$imagines} a spider webbing in her office.

(27) CIRCUMSTANCE C: Cecilia is constructing a scenario in which the spider who was webbing in her office is webbing.

The above notwithstanding, the deviance of (26-ii) can still be explained through a pragmatic competition of the verbs *remember* and *imagine*: Obviously, if *remember* and *imagine* were to contribute exactly the same meaning (in a wide sense that also includes pragmatic, use-conditional meaning) to the sentences in which they occur, it would be very surprising to find different predicates for remembering and imagining in language after language.

To explain the intuitive difference in felicity between (26-i) and (26-ii) without postulating a difference in the truth-conditional contribution of *remember* and *imagine*, I assume that these two verbs form a two-value Horn scale (Horn, 1972) that is ordered with respect to 'factivity-inclination' (in (28); see also Sect. 5.1).

(28) remember > imagine

Since *remember* is the stronger element on this scale – such that it is 'more' factive than *imagine* (in a sense specified below) –, a speaker's use of the verb *imagine* triggers a pragmatic inference to *not remember*. This inference is based on Grice's (1975) maxim of Quantity. The latter demands that the speaker in a conversation "make[s their] contribution as informative as is required (for the current purposes of the exchange)" (Grice, 1975, p. 45). Specifically, since the hearer typically assumes that the speaker obeys Grice's maxims, they will interpret the speaker's utterance of (26-ii) as (29). (Rationale: if (26-i) were true, – given the speaker's commitment to Quantity – the speaker would have explicitly said so.) The falsity of (29) then explains the impression of deviance of (26-ii).

(29) Cecilia does not remember a spider webbing in her office.

Because pragmatic factors are typically excluded from an expression's lexical/conventional, context-independent meaning (with which the investigation from this paper is concerned), I do not count (26-i) and (26-ii)'s different behavior with respect to Circumstance C as indicative of a difference in meaning.

A summary of the truth-conditional similarities of (4a-i) and (4a-ii) is given in Table 1 (consult also the list of circumstances and illustrations from Appendix A). In the table, '**T**' indicates that the report is true in the specified circumstance of evaluation. '(**T**)' marks true reports whose intuitive truth-value judgement (viz. 'false', 'infelicitous', or 'deviant') is influenced by pragmatic factors. Table 1 establishes both episodic remembering and imagining as non-veridical constructive simulation processes.

	imagine, (4a-ii)	*remember*, (4a-i)
A. Generativity:	**T**	**T**
B. Non-factuality:	**T**	**T**
C. Veridicality:	(**T**)	**T**

Table 1: Shared truth-values of the reports in (4a).

This completes my discussion of the truth-conditional similarities between the English verbs *remember* and *imagine*. I next turn to the truth-conditional differences between these verbs. The reader will see that, while *remember* has a different truth-contributional pattern from *imagine*, it still allows for a continuist account of episodic remembering. On this account, remembering is past-directed, referential, and accurate imagining, as I will elaborate in Section 6.

5 Truth-Conditional Differences

My description of episodic remembering as a relation to a personally experienced past event (see Sect. 2.2) already suggests that the verbs *remember* and *imagine* are subject to substantial truth-conditional differences. These differences show in circumstances in which the content of Cecilia's (mnemically or imagistically) constructed scenario is not past-directed (see Sect. 5.2) or is vastly inaccurate with respect to Cecilia's original experience (see Sect. 5.1). They also show in circumstances in which Cecilia's constructed scenario does not feature the object of any previous experience (see Sect. 5.3) or combines the objects of different experiences (see Sect. 5.4).

My argument that these truth-conditional differences reflect a difference in the (conventional, context-independent) meaning of the verbs *remember* and *imagine* – and hence, in the acts of episodic remembering and imagining – is based on Cresswell's (1982) 'Most Certain Principle'. This principle asserts that "if [for] two [declarative] sentences A and B, [...] A is true and B is false [in the same circumstance], then A and B do not mean the same" (Cresswell, 1982, p. 69; inserted material from Zimmermann and Sternefeld, 2013, p. 28).

The Most Certain Principle suggests that one can tease apart the meanings of *remember* and *imagine* by investigating the truth-conditions of some carefully chosen memory and imagination reports. Specifically, according to the Most Certain Principle, identifying a semantic difference between *remember* and *imagine* amounts to finding a circumstance of evaluation that makes a certain episodic imagination report (e.g. (4a-ii)) true, but a maximally similar memory report (with the same subject and embedded clause; here: (4a-i)) false, or vice versa (see Liefke and Werning, 2024). Since continuism claims that remembering is just a particular kind of imagining, this position is compatible with circumstances of evaluation that make a certain imagination report true, but a maximally similar memory report false or deviant. Arguing against continuism would require finding at least one circumstance that would make a certain memory report true and a maximally similar imagination report false (or deviant).

I will argue below that, since my representative choice of evaluative circumstances does not include a circumstance of the latter sort, the truth-conditions of *remember* and *imagine* provide another piece of support for continuism. The representativity of these circumstances is ensured by the fact that they cover a wide range of possible parameters, viz. diachronicity (past/non-past), particularity (no/yes), experiential grounding (no/yes: single, multiple), and generativity (no/yes: weak, strong) (see Appendix A). As a result, the circumstances below include past- (A-D, F, G) and future-directed circumstances (E) with unspecific/arbitrary (F), single experience-based (A-E), and multiple experiences-based (G) individual objects whose properties match (C), contradict (B), or add to the content of Cecilia's original experience (A).

5.1 Severe inaccuracy

Much contemporary work in the philosophy of memory addresses the success-conditions of episodic remembering. While this work has proposed various candidates for these conditions, most researchers agree that successful remembering requires some degree of accuracy (see e.g. Bernecker, 2010; McCarroll, 2018; Michaelian and Sant'Anna, 2022; Michaelian, 2023). Admittedly, accuracy does not demand a perfect representation of the original(ly) experience(d event) or some part of it. Rather, it only requires that the remembered content is "sufficiently similar" to the content of the original experience (Bernecker, 2010) or that the remembered content is "true-in-large-part" of this experience

(Perrin and McCarroll, 2024, p. 15). However, accuracy excludes from successful remembering scenarios whose content is wildly different from the content of the original experience.

The deviance of the *remember*-report (30-i) in Circumstance D supports this intuition. In this circumstance, Cecilia is constructing a scenario in which the spider from her office is wearing an orange a top hat (see (31)). This circumstance is illustrated in Figure 5.

(30) Cecilia {i. ?? remembers, ii. ✓ imagines} a spider wearing an orange top hat (in her office).

(31) Circumstance D: Cecilia is constructing a scenario in which the spider who was webbing in her office is wearing an orange top hat.

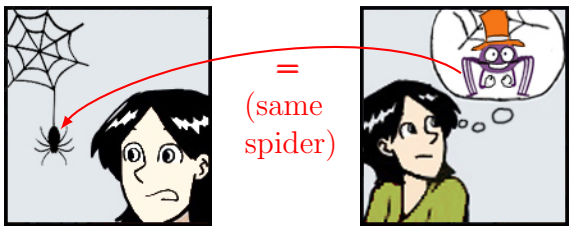


Figure 5: Circumstance D and its context.

Arguably, assuming that *imagine* has a second-order use in (30-ii) (s.t. *a spider* is interpreted relative to an underlying experience; see Sect. 4) – and granted the counterfactuality of *imagine* (see Sect. 4.3) –, the imagination report (30-ii) is intuitively true in Circumstance D (as indicated by the checkmark in (30-ii)). In particular, since, in imagination, we can attribute familiar objects any non-actual properties, there is nothing strange about the spider from Cecilia's office wearing an orange top hat in Cecilia's imagination. Circumstance D is thus reminiscent of the example in (32) (from Ninan, 2012, p. 18).

(32) Ralph is imagining that the man whom he saw sneaking around on the waterfront last night is flying a kite in an alpine meadow.

In contrast to the imagination report (30-ii), the memory report (30-i) is not intuitively true in Circumstance D. This holds despite the generativity of episodic memory (see Sect. 4.1) – possibly because spiders wearing an orange top hat is neither a part of general world knowledge nor of stereotypical episode information. This consideration explains why (30-i) is at best deviant, if not straightforwardly false, in Circumstance D. This deviance is reflected in the double question mark in front of (30-i).

5.2 Non-past-directedness

My previous elaborations have described memory as past-directed (see the use of past tense *was* in (5a-i) and (8e–i)). That past-directedness is a hard condition on episodic remembering (as assumed in, e.g., Cheng et al., 2016; Tulving, 1972; Michaelian, 2022) is shown by the deviance of (a variant of) the *remember*-report (4a-i) in Circumstance E below. The latter is a circumstance in which the content of Cecilia's remembering/imagining is not past-, but future-directed (see (33)).

(33) CIRCUMSTANCE E: Cecilia is constructing a future scenario in which the spider whom she has seen in her office is webbing.

To ensure that at least one of the target reports (i.e. (4a-i) or (4-ii)) is true in this circumstance, I replace the tenseless (and thus, past-directed)[22] clause *a spider webbing* by the future-tensed clause *a spider will be webbing*. To allow for the overt expression of future tense, I replace the (non-finite, untensed) gerundive small clause from (4a) by a (finite, tensed) non-manner *how*-clause in (34) (see Liefke, 2023b). Since gerundive small clauses and non-manner *how*-clauses both denote events (see Umbach et al., 2022), this replacement is otherwise meaning-preserving.

(34) Cecilia {i. ⁇ remembered, ii. ✓imagined} how a spider will be webbing in her office.

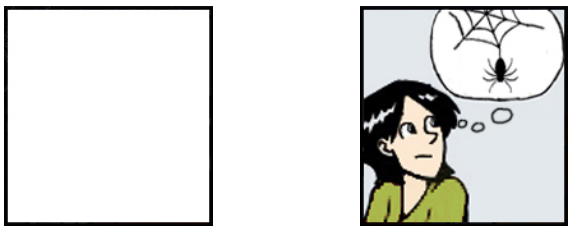
The truth of the *imagine*-report (34-ii) in CIRCUMSTANCE E reflects the fact that – in contrast to episodic remembering – imagining is not restricted to past-directed contents.

5.3 No referential dependence

Apart from their contents' past-directedness, episodic memory and imagination reports also differ in their demand for an underlying experience, e.g. a perception (see (20), Fig. 3) or a hallucination or dream (see (25), Fig. 4). This is apparent in CIRCUMSTANCE F (see (36); illustrated in Fig. 6). In this circumstance, Cecilia is constructing a scenario in which some spider or other – no one in particular, whom she has come across in real life – is webbing in her office. The spider that features as the salient object in Cecilia's constructed scenario is thus an unspecific or arbitrary object in this circumstance (along the lines of Fine, 1986; Fodor, 1970; see Forbes, 2006; Zimmermann, 2016).

(35) Cecilia {i. ⁇ remembers, ii. ✓imagines} a spider webbing in her office.

(36) CIRCUMSTANCE F: Cecilia is constructing a scenario in which some (arbitrary) spider – no one in particular – is/was webbing in her office.



NO context CIRCUMSTANCE F

Figure 6: CIRCUMSTANCE F.

While the imagination report (4a-ii)/(35-ii) is intuitively true in CIRCUMSTANCE F, its *remember*-counterpart, i.e. (4a-i), is deviant or false in this circumstance (see the double superscript question marks in (35-i)).[23] The deviance of the memory report (4a-i)/(35-i)

[22] The past-directed interpretation of embedded clauses in (4a) is due to the fact that, in English, tenseless embedded clauses have a simultaneous and a back-shifted interpretation (see Ogihara, 1989; Abusch, 1997; who have discussed this phenomenon as 'Sequence of Tense').

[23] An anonymous reviewer has suggested that, like Martin and Deutscher's (1966, pp. 167–168) 'painter' case, CIRCUMSTANCE F has two possible interpretations, viz. one in which Cecilia lacks any relevant past experience (s.t. the context box in Fig. 6 is really empty – there is genuinely 'NO context') and one in which Cecilia only *thinks* she lacks a relevant past experience (s.t. the context box is not empty, but only

in circumstances like F – which do not assume an underlying experience at which the referent of *a spider* could be fixed – suggests that episodic memory is a second-order (or 'parasitic') attitude (see Maier, 2015; Blumberg, 2018; see my introduction to Sect. 4). The latter is a mental state whose content depends, for its reference, on an underlying experience (in CIRCUMSTANCES A–G: on the spider from Cecilia's perception or dreaming). Examples of such dependence are given in (32) (due to Ninan, 2012, p. 18) and (37) (due to Blumberg, 2019, p. 97):

(37) Last night John dreamed that he was being threatened by a woman. Now John is imagining that the woman who threatened him is swimming in the sea.

The second-order nature of episodic remembering is reflected in Tulving's (1989) definition of episodic remembering as recall of a "personally experienced [e.g. visually perceived] past event" (p. 4). A referential dependence of this sort is not required by episodic imagination, as indicated by the intuition that (4a-ii)/(35-ii) is true in CIRCUMSTANCE F. In contrast to episodic memory, imagination thus allows that all of its objects are only created in the act of imagining.

The second-order nature of episodic remembering is also supported by the particular truth-conditions of *remember*-reports: Unlike the imagination report (4a-ii), some episodic memory reports lack both *de re*- and *de dicto*-truth-conditions. The former are truth-conditions that relate the attitudinal agent to a particular object (Latin: *res*). The latter are truth-conditions that relate the agent to a propositional content (or *dictum*). In the relevant cases, the truth-conditions of these reports require that the propositional content is referentially dependent (or 'parasitic') on another attitude or experience.[24] An example of such report in given in (38), which uses the dream-version (see (25)) of CIRCUMSTANCE B.

(38) *Context:* Last night, Cecilia dreamt of a spider sitting still in its web [= <u>not</u> webbing].

a. (Now,) Cecilia remembers a spider webbing.

i. There exists a particular real-world spider whom Cecilia remembers webbing. (*de re*)

ii. Cecilia is mnemically constructing a scenario in which a spider is simultaneously webbing and not webbing. (*de dicto*)

iii. Cecilia is mnemically constructing a scenario in which <u>the</u> spider <u>from her dream</u> is webbing. (*de credito/de hospite*)

The parasitic truth-conditions of (38a) are supported by the observation that – given the context in (38) – (38a) is false on its *de re*-interpretation (which interprets the indefinite *a spider* as an actual particular; see (38a-i)) and is contradictory on its *de dicto*-interpretation (see (38a-ii)). The parasitic interpretation of (38a) (in (38a-iii)) is then

inaccessible to her). In Martin and Deutscher's case, the former corresponds to the perspective of the painter (who, in his mind, is spontaneously making up the painted scene). The latter corresponds to the perspective of the painter's parents (who recognize the scene as an accurate depiction of a scene the painter once visited in his childhood). Following Martin and Deutscher, the painter's 'making up the scene' would be considered a case of imagining from the painter's perspective, but a case of episodic remembering from the parents' perspective. Note however that, in contrast to Martin and Deutscher's case, CIRCUMSTANCE F explicitly excludes ANY relevant context (including inaccessible past experiences). My judgement from (35) thus aligns with Martin and Deutscher's judgement about the painter's perspective.

[24] Yanovich (2011) has called such truth-conditions *de credito*. In (Liefke and Werning, 2024), they are called *de hospite*.

prompted by the observation that (38a) has plausible truth-conditions on an interpretation that fixes the referent of *a spider* at another attitude or experience (here: Cecilia's dream last night).

5.4 Multiple referential dependence

Remarkably, while memory reports like (4a-i) require an underlying experience such as a perception or a dream, they seem to resist the referential dependence on multiple different experiences. An example of such 'multi-dependence' is given in Circumstance G (see (39); illustrated in Fig. 7). In this circumstance, Cecilia is constructing a scenario in which the spider whom she has seen in her office is webbing the monster of which she dreamt last night.

(39) Circumstance G: Cecilia is constructing a scenario in which the spider whom she has seen is webbing the monster of which she dreamt.

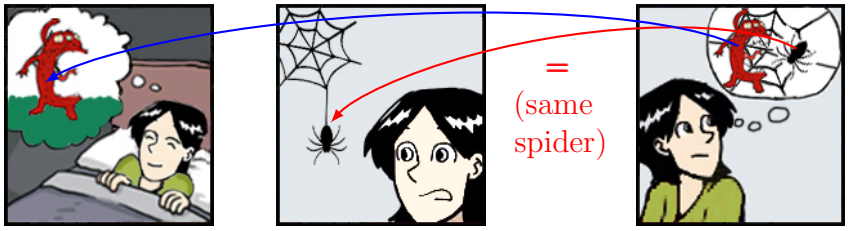


Figure 7: Circumstance G and its contexts.

The above circumstance is reminiscent of Blumberg's (2019, p. 99) 'arbitrary sequence'-case:

(40) John thinks that a mathematician dented his car, and yesterday he imagined that a woman kicked him. Now he's dreaming that the mathematician who dented his car is dancing with the woman who kicked him.

To ensure that at least one of our target sentences is true in Circumstance G, I change the memory and imagination reports from (4a) to the reports in (41). (41-i/ii) differ from (4a-i/ii) in containing an extra, viz. indirect, object *a monster*, such that the verb *web* has a transitive use in (41) (whereas it has an intransitive use in (4a), on which it only accepts a single, direct object).

(41) Cecilia {i. ? remembers, ii. ✓ imagines} a spider webbing a monster in her office.

As the counterfactuality of imagination would lead one to expect, the *imagine*-report (41-ii) is intuitively true in Circumstance G. This is not straightforwardly so for its memory counterpart (41-i) however. In particular, (41-i) is deviant in high-stake contexts like a legal inquiry, in which much depends on the rememberer's accurate representation of the originally experienced episode (here: Cecilia's perceived visual scene in her office).

Importantly, the above is not to say that (41-i) can never be true in 'multi-source' circumstances like G. This holds especially in light of the constructive nature of episodic memory (see Sect. 4.1) and the attendant possibility of supplementing original episode (or experience) content with further information – including information about particular and arbitrary objects.[25] Since low-stake contexts (e.g. chatting with a close friend) even allow

[25] I thank John Sutton for raising my attention to this point.

for the supplementation of information from other episodes (see e.g. Aronowitz, 2023), they are in principle compatible with multi-source memory. When the monster in (41-i)/ CIRCUMSTANCE G is regarded as an 'admissible' individual in Cecilia's constructed mnemic scenario, this is due to the high tolerance for generativity in low-stake contexts. My use of only a single superscript question mark on (41-i) is a consequence of this observation.

This completes my survey of the truth-conditional differences between memory and imagination reports. Below, I use the truth-conditional behavior of these reports to argue for a continuist position about episodic remembering and imagining.

6 Towards a Continuist Account

I have suggested in the introduction to this paper that the truth-contributional differences between episodic uses of *remember* and *imagine* do not stand in the way of a continuist account of episodic remembering. This account is also supported by the striking distributional similarities between the verbs *remember* and *imagine*, which I have detailed in Sections 2 and 3 (see also Appendix B). Following a contrasting summary of the truth-conditional behavior of these two verbs – and an inference to the additional requirements on episodic remembering *vis-à-vis* imagining – (in Sect. 6.1), I will give a continuist account of episodic remembering as past-directed, referential, and (largely) accurate imagining (in Sect. 6.2).

6.1 Truth-conditional behavior: Summary

We have already seen (at the end of Section 4) that the memory and imagination reports (4a-i) and (4a-ii) are true in some of the same evaluative circumstances (see A–C in Table 2, below). While this sharing of truthmarkers points to a similarity in the (conventional, context-independent) meaning of *remember* and *imagine*, their divergence with respect to other truthmaking circumstances suggests that this similarity is not a fully-fledged semantic identity (by Cresswell's Most Certain Principle; see the introduction to Sect. 5). Of course, since most languages have distinct predicates for remembering and imagining, this is not surprising.[26]

The previous section has identified four different kinds of circumstances that distinguish the meanings of *remember* and *imagine*. These include circumstances in which the content of the constructed scenario is not past-directed (E), in which the scenario is severely inaccurate with respect to the original episode or experience (D), in which the scenario does not depend, for its referent, on the content of another experience (F), and in which the scenario depends, for its referents, on multiple different experiences (G).

The truth-values of relevant adaptations of the reports (4a-i) and (4a-ii) in these different circumstances are summarized in Table 2. There, '**T**' indicates that the respective report is true in the specified circumstance of evaluation. Double question marks indicate cases in which the report's truth-value is debated or cannot be determined (e.g. due to presupposition failure). A single question mark indicates cases in which the report's truth depends on further, non-linguistic assumptions (e.g. low-stake contexts, which allow for strong(er) generativity).

[26]This holds especially if we assume a parsimony pressure on language evolution, which limits the emergence/preservation of words that have exactly the same (semantic, pragmatic, and subjective) meaning.

	imagine, (4a-ii)	*remember*, (4a-i)
A. Generativity:	**T**	**T**
B. Non-factuality:	**T**	**T**
C. Veridicality:	(**T**)	**T**
D. Severe inaccuracy:	**T**	**??**
E. Non-past-directedness:	**T**	**??**
F. No referential dependence:	**T**	**??**
G. Multiple ref'l dependence:	**T**	**?**

Table 2: Diverging truth-values of the reports in (4a).

Remarkably, CIRCUMSTANCES D–G all make a (suitably adapted) version of the imagination report (4a-ii) true. The deviance of an analogous version of the memory report (4a-i) in these circumstances suggests that *remember*-reports have stricter truth-conditions – and hence, a more specific conventional, context-independent meaning – than *imagination*-reports. This is in line with the continuist claim that episodic remembering is a special kind of imagining that only differs from imagining in its temporal orientation (viz. past) and in degree (see e.g. Addis, 2020; Michaelian, 2016; Munro, 2021; Langland-Hassan, 2021).

6.2 A continuist account of episodic remembering

The distributional and truth-conditional properties from Sections 2 to 5 suggest that episodic remembering and imagining share a common set of necessary conditions, but that these conditions are not by themselves jointly sufficient for episodic remembering. I detail these conditions below, starting with the necessary and jointly sufficient conditions for episodic imagining:

Necessary and jointly sufficient conditions for episodic imagining. (I.1)–(I.3) below are necessary conditions for the truth of an episodic attitude report of the form '*a remembers/imagines p*', where *a* is a proxy cognitive agent and *p* (for 'proposition') is a representational content:

(I.1) *a* constructs a scenario, σ, in which *p* is true; (episodicity)

(I.2) σ is perspectival/encodes a particular perspective; (perspectivity)

(I.3) σ is informationally richer than (i.e. semantically includes) *p*. (generativity)

Conditions (I.1) and (I.2)/(I.3) are supported by the selectional and, respectively, by the modificational similarities of the verbs *remember* and *imagine* (see Sect. 3.1, 3.2). This holds especially since the vast majority[27] of linguistic constructions that can be embedded under these verbs (i.e. (8)) are interpreted as events, scenes, or 'scenarios' (see e.g. Barwise, 1981; Grimm and McNally, 2015, 2022; Higginbotham, 2003). The perspectival nature of scenarios (see (I.2)) is supported by the possibility of specifying the scenario's perspective through a viewpoint adjunct or locative modifier (see (14)). Scenario generativity (see (I.3)) is supported by the possibility of emphasizing rich scenario content

[27]The only exception are *whether*- and *that*-clauses like (8f/g) (which can also be embedded by propositional/semantic uses of *remember* and *imagine*; see Liefke, 2023a) and concrete direct objects like (8k) (which can also be embedded by transitive uses of *remember* and *imagine*; see D'Ambrosio and Stoljar, 2021).

through an experiential modifier like *vividly* (see (11)) and by (4a-i/ii)'s truth in circumstances (e.g. CIRCUMSTANCE A) that involve partly novel [= non-experience-based] scenario content.

At a more general level, Condition (I.1) is supported by (4a-i/ii)'s truth in all of CIRCUMSTANCES A–C, which share the assumption that Cecilia is constructing a scenario in which certain things are the case. Conditions (I.1)–(I.3) roughly correspond to Stephenson's (2010, p. 153) conditions for vivid uses of *imagine* (see also Higginbotham, 2003). Note that the above conditions for episodic imagining include neither non-factuality (see Sect. 4.2; CIRCUMSTANCE B) nor veridicality (see Sect. 4.3; CIRCUMSTANCE C). This is so since (non-)factuality and veridicality express possibilities for – rather than constraints on – the truthmaking circumstances of episodic attitude reports.

The stricter truth-conditions of memory reports (*vis-à-vis* imagination reports) already suggest that episodic remembering is subject to further, jointly stricter, conditions. The latter are given below:

Further necessary conditions for episodic remembering. When combined with (I.1)–(I.3), the conditions below are jointly sufficient for the truth of a memory report of the form '*a remembers p*'. In (M.1)–(M.2), CONT(σ) (which properly includes p) is the propositional content of σ (following Kratzer, 2006).

(M.1) σ is a scenario of the past (hence, CONT(σ) is past-directed); (past-directedness)

(M.2) much of CONT(σ) is true of the original (episode/) experience; (accuracy)

(M.3) CONT(σ) is referentially dependent on at least one experience; (parasitism)

(M.4) a presumes that CONT(σ) is true of a single experience. (singular anchoring)

Conditions (M.1) and (M.2) are supported by the observation that only the imagination, but not the memory report from (4a) is true in CIRCUMSTANCE E (where the scenario content is future-directed) and in CIRCUMSTANCE D (where the scenario content is grossly inaccurate with respect to the original experience). Condition (M.3) is supported by the observation that episodic memory reports cannot be true in circumstances (e.g. CIRCUMSTANCE F) where the constructed scenario is referentially independent of any other experience. Condition (M.4) is motivated by the intuition that, in high-stake contexts that only allow for minimal generativity, memory reports are not true in circumstances (like CIRCUMSTANCE G) that involve multiple underlying experiences (see Sect. 5.4). Condition (M.1) and a stronger version of Condition (M.2) (which demands that all of CONT(σ) is true of the original episode) correspond to Stephenson's (2010, p. 153) conditions for vivid uses of *remember*.

In view of the above, episodic remembering is past-directed (M.1), singularly parasitic (M.3/4), and largely accurate (M.2) imagining (I.1/2/3). This is in line with continuism.

7 Conclusion

In the present paper, I have argued that the distributional and truth-conditional behavior of episodic uses of the English verbs *remember* and *imagine* provides support for the continuist claim that episodic remembering is a form of imaginative mental time travel. This argument has rested on the observation that *remember* and *imagine* select for – and can be modified by – the same kinds of expressions (see Sect. 2–3) and that *remember*- and *imagine*-reports are true in some of the same evaluative circumstances (see Sect. 4). The conclusion that episodic remembering is a special kind of imagining rests on the observation that memory reports are deviant in some circumstances that make their

imagination counterparts true (see Sect. 5). Episodic memory reports thus have more demanding truth-conditions than imagination reports (see Sect. 6).

One could try to question the argument from this paper by pointing out that the intuitions concerning truth (resp. deviance) from Sections 4 and 5 are based solely on some few cherry-picked intuitions from the literature (but see my discussion of the data situation in Sect. 2.1) and are not supported by robust experimental data (e.g. from a comprehensive, suitably powered judgement study). I would like to point out that such data is indeed forthcoming (see Rosina and Liefke, in preparation). However, most of these intuitions are already supported by various existing work. This holds, e.g., for the non-factive behavior of *remember* (which is supported by Dranseika, 2020; De Brigard, 2023; de Marneffe et al., 2019), for the accuracy requirement on remembering (which is supported by the linguistic data from Dranseika et al., 2021; Stephenson, 2010), and for the remembered contents' referential dependence on an underlying experience (which is supported by the findings in Stephenson, 2010; Liefke and Werning, 2023; Werning and Liefke, accepted).

I conclude this paper with an observation about the conditions on the truth of memory and imagination reports from Section 6.2: While these conditions are purely language-based, they have an impressively large overlap with conditions on episodic remembering as specified in philosophy (and cognitive science) of memory proper (see e.g. Cheng et al., 2016; see also the present paper's Sect. 2.1). I interpret this overlap as further support for the language-based approach to mental states. I expect that future work on the language of episodic remembering and imagining will identify much more such support.

Appendix A: List of evaluative circumstances

For an easy overview, the list below contains all circumstances of evaluation from Sections 4 and 5 together with their illustrations (in Fig. 8).

A.	Cecilia is constructing a scenario in which the spider whom she has seen in her office is webbing.	(Generativity)
B.	Cecilia is constructing a scenario in which the spider who was NOT webbing in her office is webbing.	(Non-factuality)
C.	Cecilia is constructing a scenario in which the spider who was webbing in her office is webbing.	(Veridicality)
D.	Cecilia is constructing a scenario in which the spider who was webbing in her office is wearing an orange top hat.	(Severe inaccuracy)
E.	Cecilia is constructing a future scenario in which the spider whom she has seen in her office is webbing.	(Non-past-directedness)
F.	Cecilia is constructing a scenario in which some (arbitrary) spider – no one in particular – is/was webbing in her office.	(No referential dependence)
G.	Cecilia is constructing a scenario in which the spider whom she saw is webbing the monster of whom she dreamt.	(Multiple dependence)

Appendix B: The corpus method in semantic ascent

Some work on language acquisition has defended a view of verb learning (i.e. *syntactic bootstrapping*) according to which learners use a verb's syntactic distribution to acquire

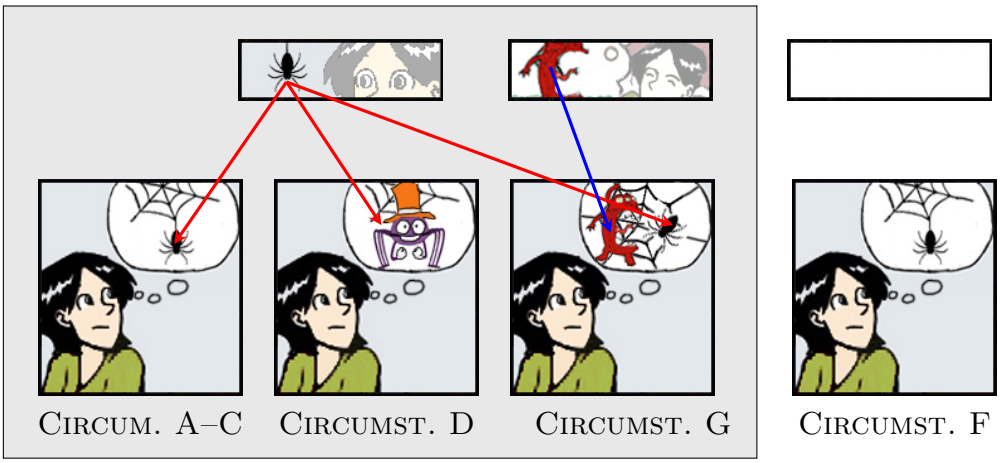


Figure 8: Different circumstances for the evaluation of (4a-i/ii).

verb meaning (see e.g. Landau and Gleitman, 1985; Gleitman, 1990; Pinker, 1994). In its 'attitudinal' version (see e.g. Hacquard, 2014, 2023; White et al., 2018; Harrigan et al., 2019), this view holds that children acquire the lexical-semantic meanings of propositional attitude verbs from the kinds of grammatical constructions that these verbs embed (see Sect. 3.1). For this to be possible, syntactic bootstrapping assumes a strong correlation between syntactic and semantic properties. Such correlation in fact holds: Thus, White et al. (2018) have shown that selectional distinctions between attitude verbs (e.g. whether a verb embeds gerundive *ing*-constructions) capture intuitive distinctions in their meaning (e.g. whether the verb has a perception component; Gleitman, 1990).

Section 3 of the present paper uses syntactic bootstrapping as a source for semantic ascent: From observations about the selectional similarity of the verbs *remember* and *imagine* – and their selectional difference to other experiential attitude verbs –, it draws conclusions about the 'similarity' of the mental states of remembering and imagining. These observations (data in Table 3, below) are in line with the findings from (White et al., 2018): Of the 30 different attitude verbs that their study[28] investigates, *remember* and *imagine* show the closest syntactic and semantic similarity – much closer even than the similarity between *remember* (or *imagine*) and *see*.

Unfortunately, White et al.'s (2018) study does not extend to the verbs *dream* and *hallucinate*. Section 3 compensates for this. To enable an easy implementation, I replace acceptability judgments with syntactic distributions that are extracted from a text corpus. This move is common in bootstrapping research and has been adopted, e.g. by Lederer et al. (1995), White (2015), and van Dooren et al. (2022).

The corpus

To ensure that the corpus study from Section 3 is sufficiently high-powered, I use one of the biggest available English text corpora, the *enTenTen21* corpus. The latter is a web corpus[29] with 52 billion words that contains 4M occurrences of the verb *imagine*, 9.9M occurrences of *remember*, 109.4M occurrences of *see*, 1.2M occurrences of *dream*, and 31K occurrences of *hallucinate*. The exact number of hits is given below:

[28] I here use 'study' to refer to their 'Experiment 1' (presented in White et al., 2018, pp. 425–434). The latter is an acceptability judgement task that asks participants to rate the acceptability of an attitude report (with a particular grammatical construction in complement position) on a 7-point Likert scale.

[29] *enTenTen21* is available via the Sketch Engine corpus manager, `https://www.sketchengine.eu/`.

`[lemma="imagine"]`:	4,037,899 hits	`[lemma="dream"]`:	1,171,189 hits
`[lemma="remember"]`:	9,932,121 hits	`[lemma="hallucinate"]`:	30,955 hits
`[lemma="see"]`:	109,361,865 hits		

One may worry that the greatly different number of occurrences of experiential attitude verbs in the *enTenTen21* corpus – *remember* is eight times more frequent than *dream* – might skew the results below. However, since I relativize the number of hits for certain 'verb + complement (or modifier)'-combinations to the number of the verb's total occurrences in the corpus, this worry is unfounded.

Dataset 1: selection

To investigate whether other experiential attitude verbs share the selectional similarities of *remember* and *imagine* (see Sect. 3.1), I search the *enTenTen21* corpus for these verbs' combinations with the different grammatical constructions from (8). In Table 3, the letters in the leftmost column correspond to the labels in (8). To ensure an accurate and exhaustive search of the different combinations, my search uses Sketch Engine's Corpus Query Language, CQL (see the second row to the left). The relevant CQL abbreviations are introduced below. In Table 3, the searched CQL expressions are obtained by concatenating '`[lemma=`' with the column label (e.g. '`"imagine"]`') and, subsequently, with the row label. (224,453 in the top third cell to the left is then the number of hits for CQL `[lemma="imagine"][tag="VVG"]`).[30] In each cell, the left number refers to the number of total hits; the bracketed right number to their % relative to the number of the verb's occurrences. In (c)/(k) in the table, '. . .' is short for '`tag="DT"|tag="PDT"|tag="PPZ"`', which captures different kinds of noun phrases.

`NNZ`	possessive noun, singular or mass	(e.g. *spider's*)
`N.*`	noun phrase	(e.g. *Tajel*, *it*, *a/the spider*)
`VVG`	verb, gerund/present participle	(e.g. *crawling*, analyzed as 'PRO *crawling*')
`W.*`	wh-words	(e.g. *who*, *what*, *where*, *when*)

`[lemma= ...`	`"imagine"]`	`"remember"]`	`"see"]`	`"dream"]`	`"hallucinate"]`
a. `[tag="VVG"]`	224,453 (5.56 %)	543,702 (5.47 %)	914,868 (0.83 %)	31,813 (2.72 %)	1,351 (4.36 %)
b. `[lemma=".*self"]`	50,952 (1.26 %)	4,840 (0.05%)	224,006 (0.20 %)	1,003 (0.09 %)	100 (0.32 %)
c. `[tag="N.*|..."]["VVG"]`	99,036 (2.45 %)	65,785 (0.66 %)	933,712 (0.85 %)	7,148 (0.61 %)	393 (1.27 %)
d. `[ ]{1,2}[tag="NNZ"]`	16,993 (0.42 %)	38,755 (0.39%)	348,144 (0.32 %)	10,345 (0.88 %)	298 (0.96 %)
f. `[lemma="whether"]`	444 (0.01 %)	8,778 (0.09 %)	176,493 (0.16 %)	250 (0.02 %)	7 (0.02 %)
g. `[lemma="that"]`	462,906 (11.46 %)	1,292K (13.01%)	3,956,908 (3.62 %)	118,569 (10.12 %)	4,052 (13.09 %)
h. `[l'a="how"|tag="W.*"]`	441,201 (10.93 %)	841,494 (8.47 %)	5,867,282 (5.37 %)	5,425 (0.46 %)	454 (1.46 %)
i. `[ ]{1}[lemma="event"]`	1,731 (0.04 %)	9,525 (0.10%)	34,461 (0.03 %)	407 (0.03 %)	47 (0.15 %)
k. `[tag="N.*"|...]`	2,312K (57.28 %)	3,079K (31.00 %)	41,263K (37.73 %)	301,576 (25.75 %)	7,214 (23.30 %)

Table 3: *enTenTen21* data on complement selection.

The data in Table 3 corroborates the selectional super-flexibility of *remember* and *imagine* (see (8)) and the more frequent occurrence of *whether*-clauses in *remember*-complements (see the paragraph preceding (9)). It further supports the claim (from the end of Sect. 3.1) that *see* typically does not occur with PRO-constructions (see (a)) and that *dream* and *hallucinate* are hesitant to combine with interrogative clauses (see (e), (h)). In Table 3, the most striking results – which support a selectional difference between *remember*/*imagine* and other experiential attitude verbs – are highlighted in grey.

[30] To preserve grammaticality, I precede the CQL for the *dream*-lemma in (a–d) and (i–k) by `[lemma="of| about"]` (which inserts *of* or *about* before the investigated grammatical construction).

Dataset 2: *vividly*-modification

The distinction between *remember/imagine* and other experiential attitude verbs is further supported by the different frequency with which words for experiential attitudes combine with experiential modifiers. To avoid an effect of word class (e.g. verb, noun) on the results of this search, I underspecify the word ending (e.g. by replacing `[lemma="imagine"]` by `[lemma="imagin.*"]`) and add a lemma for the noun *memory*. Below, the data in the rightmost column refers to the percentage of hits for '`[lemma="vivid.*"] [lemma=ATTITUDE]`' relative to the number of combined total hits for `[lemma=ATTITUDE]`, where `ATTITUDE` $\in$ {`"imagin.*"`, `"remember.*"`, `"memor.*"`, `"see.*"`, `"dream.*"`, `"hallucinat.*"`}.

(i-a)	`[lemma="vivid.*"][lemma="remember.*"]:`	14,636 hits	(0.1474%)
(i-b)	`[lemma="vivid.*"][lemma="memor.*"]:`	15,012 hits	(0.1739%)
(ii)	`[lemma="vivid.*"][lemma="imagin.*"]:`	10,053 hits	(0.2490%)
(iii)	`[lemma="vivid.*"][lemma="see.*"]:`	869 hits	(0.0008%)
(iv)	`[lemma="vivid.*"][lemma="dream.*"]:`	9,464 hits	(0.8081%)
(v)	`[lemma="vivid.*"][lemma="hallucinat.*"]:`	638 hits	(2.0610%)

Since this dataset witnesses a very low frequency of *vividly see* (in (iii)), it supports the finding (reported in Sect. 3.2; evidenced by (16)) that visual perception reports typically reject *vividly*-modification. The comparatively high frequency of *vividly*-modified *dream* (see (iv)) and – even more so – *hallucinate* (see (v)) supports my claim (attested by (17)) that *dream* and *hallucinate* allow for experiential modification.

Declarations

Competing Interests

I declare that I do not have any competing financial or non-financial interests that are directly or indirectly related to the submitted manuscript.

Acknowledgements

An earlier version of this paper was presented at the GAP.11 satellite workshop *Memory and Imagination: Varieties of (Dis)continuism* (Berlin, Sept. 2022). I thank John Sutton for raising a challenge to my original account of veridicality- and multiple dependence-cases that eventually led to the present view. Paul Egré, Kourken Michaelian, and two anonymous reviewers for RoPP have much helped improve this paper through their comments and suggestions. The paper has profited from discussions with Nikola Andonovski, Justin D'Ambrosio, Felipe De Brigard, Greg Kobele, James Openshaw, Denis Perrin, Emil Eva Rosina, André Sant'Anna, Frank Sode, Barbara Stiebels, Markus Werning, and Thomas Ede Zimmermann. A formal semantics for some of the described phenomena – that however argues for a different conclusion – is given in (Liefke and Werning, 2024). The research for this paper is supported by the German Research Foundation DFG as part of the research unit FOR 2812: *Constructing Scenarios of the Past* (grant no. 397530566) and by the German Federal Ministry of Education and Research BMBF through my WISNA professorship.

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